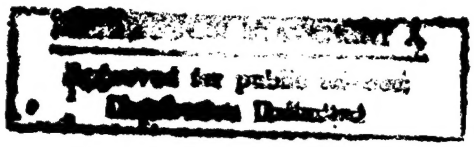
JPRS 81292

16 July 1982



West Europe Report

SCIENCE AND TECHNOLOGY

No. 111

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 81292

16 July 1982

West Europe Report

SCIENCE AND TECHNOLOGY

No. 111

FBIS FOREIGN BROADCAST INFORMATION SERVICE

JPRS 81292

16 July 1982

WEST EUROPE REPORT

SCIENCE AND TECHNOLOGY

No. 111

CONTENTS

BRIEFS

FRENCH BIOTECHNOLOGY FUNDS--In 1983 the French Research Ministry will allocate 250 million francs for research in biotechnology. In 1981 it invested 30 million francs in this field. State support for various research programs, along with research at state institutes and at private companies, will amount to a total French investment in biotechnology of 1 billion francs next year. [Text] [Stockholm NY TEKNIK in Swedish 20 May 82 p 17] 9336

CSO: 3102/351

GOVERNMENT DECISIONS ON RESTRUCTURING OF CHEMICAL INDUSTRY

Paris CHIMIE ACTUALITES in French 28 May 82 pp 2,3

[Text of Industry Minister Pierre Dreyfus' press release on his plan to restructure France's chemical industry]

[Text] In its substance as well as its form, the "rationale" released in exegesis of the decisions taken in the 12 May cabinet meeting, and handed to the press the following day by the Minister for Industry, merits publication in extenso.

As we reported on the front page of our previous issue, the message that emerges from this text indicates that the idea from now on will be for government to be more energetic than particular about minor details.

Even though it ranks fourth worldwide in its volume of production, the French heavy chemical industry is a sick industry. After 20 years of hesitation, of strategic tergiversation, and of mergers that failed because they were not undertaken as part of any overall plan, it is beset today with a sea of troubles comparable to those the steel industry is suffering, and this is happening in spite of the skill and dedication of the men who have whole-heartedly worked to make it grow.

In 1981, the six state-owned companies in the sector (Rhône-Poulenc, CdF-Chimie, ATO, and Chloe -- subsidiaries of ELF-Aquitaine and CFP, PCUK, and EMC [Entreprise Minière et Chimique] (most of whose chemicals activity is conducted outside France), to which we should add Cofaz, a subsidiary of Paribas, and the chemical holdings of Elf-Aquitaine and SNPE [National Powder and Explosives Company] -- have lost 4 billion francs. State-owned chemical companies, with a volume of business of 80 billion francs and more than 110,000 people on their payrolls, account for almost half of the sector's potential, and for most of the basic chemicals industry.

It was high time, therefore, to take the necessary action to remedy the situation, unless we were willing to accept a debacle that would have had horrendous impact on the economic and social levels. This is why we suggested to the cabinet yesterday that we regroup our efforts around three major objectives.

Why This Situation?

The French chemical industry was headed for ruin, for a number of reasons:

1. Like all its European competitors, our heavy chemical industry failed to anticipate the halt in growth in the wake of the oil price hikes; today it is laboring under the burden of considerable excess capacity, which gives rise to a drastic decline in prices and to a suicidal and fratricidal war among producers.

2. The French chemical industry is heavily dependent on foreign suppliers for raw materials, and hence has been hot by costs in excess of those of come of its competitors who are vertically integrated or who have access to cheaper resources.

3. Our conventional chemical industry is not getting adequate backup from value added by refined chemical products and by technical and marketing know-how: the French chemical industry makes products requiring less processing than those of its German or American competitors, and handles its marketing activities less expertly.

4. The industry as a whole has only a fair-to-middling productivity record, both because its main plants do not have facilities for processing on the requisite scale, and because they are so widely scattered that their transport costs are prohibitively high, and they fail to promote the r products properly.

5. French-owned plants are concentrated here, though the competition is European, if not world-wide, due to the lack of facilities that would enable them to extend their competition into other markets, and consequently our chemical industry is falling back to a defensive position.

6. Lastly, the state-owned chemical industry is in dire financial straits as a result of the accumulation, over a period of years, of low returns and of rising indebtedness.

Nationalization of these companies makes it possible to remove the built-in obstacles to rescuing our heavy chemicals industry and pulling it out of its morass of debt with the state doing its duty as shareholder; nationalization also opens the door to better long-run deployment of such trump cards as exapnsion of the refined chemicals sector.

In order to rebuild the foundations for a dynamic chemical sector, our action will consist of laying down some clear-cut guidelines as to the goals to be aimed at and the restructuring to be undertaken, leaving it to industry leaders to spell out the contours and pace of the process.

Sector-wide inertia has now reached a point where any reorganization must first be designed in a long-term optimum perspective, prior to defining, on the basis of what we have now, the practical steps most likely to match the ideal design. Both interim and final structures must, further, encourage consistency in investment decisions, whether at the national or the corporate level.

This is going to be a tough job, and history has shown us just how hard. Reason, however, commands that we move forward and this last chance for the chemical industry to profit by the expansion of the public sector must be taken full advantage of. This remodeling process must be based on several principles:

* In heavy chemicals, the first thing to be done is to make our plant competitive again, while concentrating our investments in modernization on the few plants we have that are big enough to be properly balanced and well placed in relation to their raw materials supplies and to the market. We must also absorb our excess capacity, working with other European producers. Lastly, we must move to consolidate our raw materials supplies and to nurture, especially in the chloridation sector, France's competitive edge deriving from its nuclear power program.

* Even while this streamlining in the upstream portion of heavy chemicals goes on, we must develop new downstream activities in advanced chemicals, both to win back our markets and to provide the necessary job replacements.

We have therefore devised six major lines of action:

1. For petrochemicals, a return to the best industrial plant sites France has to offer is deemed indispensable.

The commanding position of Ato-Chloé and CdF Chimie (70 percent of the market) lays a very special responsibility on these two partners. They will be asked to draft a program of concerted raionalization, since the competitition constraint prohibits any rapprochement along simpler lines.

2. Downstream from the heavy chemical sector, it is desirable for the French chemical industry to have a range of plastics in the higher value-added categories. The companies now active in this area will be asked to submit a coordinated production and marketing program for their existing products, and for the development of new products.

3. The Southwest region has accommodated a good many chloride chemical plants now owned by Chlor, PCUK, and Rhône-Poulenc. All this processing capacity must be reorganized along more logical lines.

The heads of SNEA and Rhône-Poulenc will be assigned the mission of proposing the procedures for regrouping, both global in one of them, and divided between two major forces in the other: the PVC system on the one hand, and the non-PVC chlorinated product system on the other.

4. In order to cope better with foreign competition, it seems desirable to cut back on the number of operators in the fertilizer sector, and accordingly the five corporations concerned, Rhône-Poulenc, CdF Chimie, Paribas-Cofaz, ELF, and EMC will be asked to propose a regrouping of efforts in two of the companies concerned, with supplies of raw materials also being closely coordinated between them.

5. Heavy mineral chemical operations, aside from fertilizers, are not in bad shape, and are still showing a profit. It is important here to get everything we can out of the assets which EMC, Rhône-Poulenc, and PCUK hold. Their heads will be called upon to come up with a joint strategy for developing the most promising products for the future in the best possible plants.

6. The French chemical industry's best bets, when it comes to jobs and value-added, are concentrated in advanced chemicals. This portion of the industry lacks the necessary connections and tie-ins with the thinking in the major petrochemical and mineral operators.

Advanced chemistry, on the other hand, requires technologies that will work in a variety of small markets where industrial and marketing domination must be worldwide. We must concentrate the efforts of each operator on the markets he dominates.

The heads of Rhône-Poulenc and SNEA will be responsible for suggesting, sector by sector, a plan of action with one clearly designated leader. This is what must be done, if the state is to be able to make sure that the very large sums needed to expand the chemicals sector are to be put to the best possible use.

NEW STRUCTURES

While respecting the managerial autonomy of the state-owned companies, it will, in the end, come down to proposing boundaries between their activities, and coordinated scheduling of operations. It therefore seems to us that reorganization of the state-controlled chemical industry will have to be concentrated around three major poles: Rhône-Poulenc, ELF-Aquitaine, and CdF-Chimie.

a. Rhône-Poulenc

This conglomerate will have as its essential objective to build up its identity world-wide as a major force in the fields of health, advanced chemistry, and the bio-industries. With this aim in view it will have to buckle down and expand its research activities and its international presence.

In addition to all this, it will retain basic chemistry upstream of its major activities, hang on to the positions it wins back in certain synthetic fibers, and develop some of its more promising diversification activities, such as polyester films and data systems.

b. Elf-Aquitaine

The Elf-Aquitaine conglomerate is already heavily involved in horizontal integration: its participation on a par with CFP in ATO-Chloe, its array of advanced chemicals subsidiaries (CECA, M. and I, etc.), and Sanofi, the second-biggest pharmaceutical firm in France, its holdings in parachemistry (housing and paints, for example) and bio-industry, and finally its American subsidiary, Texasgulf, a major producer of phosphates and fertilizer.

Along with new financing for modernizing ATO-CHloe's industrial plant, the ELF corporation will acquire a majority interest in this conglomerate and will take over management of industrial operations.

In addition, reflecting its concern with streamlining halogen chemistry and expanding advanced chemistry, the Elf-Aquitaine group will, between now and the end of 1982, take over most of PUK's chemical activities with the exception of its coloring-agents division. Once that takeover has occurred, it will be up to Elf-Aquitaine to negotiate with the other members of the chemical community over certain reclassifications of activities.

Once these operations are completed, SNEA will emerge as a chemicals conglomerate of world dimensions, with a sound balance among its heavy chemicals, halogen chemicals, and advanced and pharmaceutical chemicals.

The coloring-agents division of PCUK, which will remain for a time in PUK, cannot hope to regain its health in the long run anywhere but in cooperation with another European producer.

c. CdF-Chimie

Quite naturally, it will be up to this group to promote, with help from the nationalized coal mining companies, the outlook for coal chemistry;

1. In the short term, though, it will have first of all to restore some degree of balance among its petrochemical activities.

Furthermore, CdF-Chimie will have to step up its competitive abilities in nitrate fertilizers and expand some of its chemical specialty activities, such as adhesives, paints, inks, and certain special-purpose plastics. Without prejudice to the outcome of discussions anent the six avenues of action set forth above, the ultimate fate of EMC remains to be decided. A number of possibilities might be contemplated for its chemical activities, most of them located outside France. One such possibility would be to expand the role of this group in mineral chemistry and in raw materials for fertilizers.

* In the fertilizer industry, simplification of the marketing channels will save farmers the excess charges for distribution which are a heavy burden to them today;

* In petrochemicals, two groups involved will be asked to help revamp the downstream sector of plastics processing.

Nationalization makes it possible to put an end to the personal and corporate rivalry that had kept the French chemicals industry in a state of Balkanization that would eventually have meant its death. It is now up to these executives and their management teams to mould these groups faced with a difficult situation into dynamic and profitable companies, the only kind that can bring us social progress and new jobs; but this will be possible only insofar as the state plays its role as shareholder to the fullest and, beginning this year, makes the financial contribution essential to get our chemical industry back on its feet.

6182

CSO: 3102/360

CHEMICALS

RESTRUCTURING OPTIONS FOR CHEMICAL INDUSTRY DISCUSSED

Paris LE MONDE in French 4 May 82 p 23

[Article by Andre Dessot: "Restructuring the Chemical Industry: A Costly Operation That Causes Hesitation"]

[Excerpts] Pierre Dreyfus, minister of industry, was to make a presentation to the cabinet 28 April about the broad directions selected for restructuring of the French chemical industry. As on the two preceding Wednesdays, this speech was put off until a later date. The chemistry file is thick and, although the sector-by-sector analysis of the situation has been finished, the work undertaken to find the solutions that are the best adapted to reforming this industry is dragging.

Four Poles?

The basic idea supposedly is to create three or four poles, one "petrochemical" around Elf Aquitaine, the other "fine chemistry" with Rhone-Poulenc as leader, the third for heavy chemistry and coal chemistry under the direction of CdF [French Coal] Chemistry and the vocation of the fourth yet to be defined.

It is beyond this fairly loose outline that matters become complicated, with the entire solution revolving around the eternal question: How do you cut up without mutilating?

All of the working hypotheses have been foreseen and all the possibilities evoked. In the name of a certain industrial logic, certain parties advocate withdrawing all its chemistry from PUK [Pechiney Ugine Kuhlmann] and then dismanteling it by adding the "fine chemistry" activities to Rhone-Poulenc, its chlorine branch to ATO [Aquitaine Total Organico]-Chloe in the process of regrouping, with Pharmaka (pharmaceutical subsidiary) being free, it appears to promise, to become a structure for receiving small laboratories in difficulty. Finally, half the dyes could be sold to a foreign group within the framework of a joint venture. It is said that EMC [Mining and Chemical Enterprise] could also be cut up. Its animal feed activity [Sanders] would go to Rhone-Poulenc, which is already well armed in this branch, its interests in PVC to Tessenderloo (Belgium) to CdF Chemistry (or

to ATO-Chloe) and its potassium to Elf Aquitaine. However, this idea does not have unanimous support either and, depending on the fate of EMC, government employees would like to make a homogeneous group of it again or frankly attach it to ATO-Chloe. As for fertilizers, that branch could be taken from Rhone-Poulenc and joined to the activity carried out in that sector by Cofaz [French Nitrogen Company] (Paribas Total). But certain parties are not excluding the idea of dismanteling Cofaz and joining its various parts to APC [Nitrogen and Chemicals] CdF Chemistry). But then what is to be done about Rhone-Poulenc's fertilizers?

While it is criticized on the finance level, the case of Rhone-Poulenc raises the fewest problems from a structural standpoint, since the group is the only one that has succeeded in hedging its risks. It would be given means to reinforce itself further in fine chemistry and to lighten up in synthetic fibers in carrying out its restructuring plan. What will come out of this intense reflection?

In 1971, when he was president of EMC, Claude Cheysson, who is today minister of foreign affairs, had declared to ENTERPRISE (13 Feb 1971): "In order to limit the damages, we must be realistic enough to adapt our capacities to the real market conditions, which means that we must harmonize our production. That implies the closing of 'mothballing' of shops." Will those who govern us take their inspiration from this philosophy in their search for solutions? That seems likely. It seems to have been admitted already that surgery will be inevitable. The deep divergences of views on the operations to carry out, the fear that is felt in high places of severing badly and too brutally, but also the frequent disagreements found between the strategies proposed by the industry leaders and the unions within the framework of a concerted effort, essentially explain the delay in carrying out the work. In any case, the application of the remedy must be accompanied by a strong dose of oxygen. Since its investments have leveled off, in good and bad years, since 1975 at around Fr-6 billion (instead of increasing by 15 percent), the French chemical industry would need, at the very least, 15 billion to get off on the right foot. At least half of that could be devoted to the consolidation of its debts, a quarter to the reconstitution of its own funds and the rest going to [capital] investments.

The question arises as to whether the public powers have the means to back up their policies. An insufficient injection of capital or an inadequate remodeling would possibly lead to a failure of the nationalizations. Everything suggests that the real restructuring of the chemical industry is not really going to take place tomorrow and that the state will limit itself to setting down broad guidelines to the group leaders, charging them with agreeing among themselves directly in the field, according to the criteria selected, with a modest covering [of funds] for the most pressing needs.

9969
CSO: 3102/259

BRIEFS

RESTRUCTURING FRENCH CHEMICAL INDUSTRY--Will the crisis afflicting the French chemical industry bring about its restructuring? That is the question that comes to mind after the report of the council of ministers session on 12 May 1982. The minister of industry apparently announced a restructuring around three major poles, with the essential part of the chemical activities of PUK [Pechiney-Ugine-Kuhlmann] being attached to Elf Aquitaine. The two other poles would apparently be CDF Chemistry and Rhone-Poulenc. Such a restructuring should put an end to a two-headed sort of direction: Ato Chimie and Chloe would be taken over by Elf. Pechiney's fate remains unknown. Ugine Kuhlmann and its sister companies have been losing money for several years (700 million francs in 1981) and the association with Occidental Petroleum failed. PUK will be taken over by Elf which could receive a capital input so its financing capacities will not be strained. Then, Rhone-Poulenc would specialize in "fine" chemistry. The entire plan still seems quite vague. Some modifications and changes in boundaries are apparently under study now. The government is determined to play its "role as an arbiter and as a stockholder" while giving to the chemical industry "the resources of a definite policy." It should be made clear that after the nationalizations, the government now controls 54 percent of the basic chemistry industry, 14 percent of the parachemical industry, and 28 percent of pharmaceuticals. [Text] [Paris SEMAINE DE L'ENERGIE in French 18 May 82 p 7] 7679

CSO: 3102/310

DANISH INSTITUTE BUILDS SUPER-COMPUTER-BASED SIMULATOR

Copenhagen BERLINGSKE TIDENDE in Danish 11 Jun 82 p 8

[Article by Erik Bendt Rasmussen: "MOSES Is a New Super-Computer"]

[Text] A super-computer, MOSES, which is to be put into commercial production, has been developed at the Industrial Engineering Institute at the Technical University of Denmark. Its specialty, among other things, is simulation of the functions of technical and administrative systems. Its price class is from a half million to two million kroner. A patent has been applied for in the USA. Brüel & Kjaer and the Swedish Mechanics Federation have ordered two systems.

At the Industrial Engineering Institute at the Technical University of Denmark a super-computer has been developed which to all appearances will be able to fill a special niche, principally in the export market. Major Danish industries have shown considerable interest in the computer, which is called MOSES. It stands for MOdular Symbolic Electronic Simulator.

MOSES a Success

MOSES is no ordinary computer. It has been developed specially for simulating complicated technical and administrative systems, but it can also simulate physiological systems like, for example, circulation of the blood or kidney functions. MOSES can also be used in factory planning and management, for example, if new production tasks are to be introduced into production.

The first MOSES has shown what it can offer. In Denmark Brüel & Kjaer has ordered a MOSES for its own use and the Swedish Mechanics Federation (corresponds to the Danish Employers Federation and the Iron Industry's Employers Federation) has reserved a system. They are being built at the Industrial Engineering Institute, AMT [Mechanical Technology Department], with the assistance of a number of subcontractors, including Brüel & Kjaer. But since it is not the institute's real job to build computers in series, the plan is to find a firm which can produce MOSES.

The head man behind the super-computer is Graduate Engineer Licentiate in Engineering Kaj Jensen, who as a licentiate candidate developed the MOSES system under the guidance of Professor C.H. Gudnason, chairman of the Mechanical Technology Department.

MOSES will cost from a half million kroner to 2 million kroner depending on the system's size. Kaj Jensen has already applied for a patent for MOSES in the very native land of computers, the USA. This is due to the fact that, according to Kaj Jensen, this is the most difficult place to begin; for one thing, the patent law requires that a system be able to be built on the basis of the accompanying drawings.

Price 5 Million Kroner

What makes MOSES brilliant? First and foremost it is a computer-based planning system--not an electronic computer in the traditional sense. It has a very fast computing speed. It will not "chew up" a rather long time on programming and the answers appear instantaneously on the screen.

Head man behind MOSES, Graduate Engineer Licentiate in Engineering Kaj Jensen, Technical University of Denmark, with MOSES system [Photo not reproduced]. Each square box which can be seen on the board is a self-contained microprocessor. By combining them, planning courses can be constructed, which via the computer on the left appear on a screen.

Moses has been under development since 1975. The first few years Kaj Jensen succeeded in obtaining a number of smaller appropriations from foundations for introductory experiments. But from 1979 it became more and more expensive and in 1981 it was necessary to get money for manufacture of the first four prototypes. It was possible to procure very large amounts; for one thing the Technology Administration gave 1.8 million kroner from the support system for the development of socially desirable products. From 1975-1982 private foundations and firms and the public sector supported the MOSES project with about 5 million kroner. And with the large grant in 1980-1981 it was possible to start the production of four MOSES systems. Of these Brüel & Kjaer and the Swedish Mechanics Federation have ordered one each and the institute has two for its own use and for consignment to potential users. The institute will also arrange courses. Industries, public administrations, hospitals, etc., will have an opportunity to try MOSES. No previous training in electronic data processing is required.

Set Up a Firm

Meanwhile last year the institute lived with Moses and the problem that it had to be put into production on a broader scale. The McKinsey & Co. consulting firm was given the job.

"The answer was that it was necessary for a production firm to be set up very quickly or for a division to be established in a firm for taking care of production," Kaj Jensen reports. "We looked around for a Danish firm and talked with some. It seemed that the production question was easy to solve, but the firms found that the marketing job was too big. So McKinsey and the industry advised us that we let the product be tried by users in order to gain a reliable point of view concerning further development and marketing. Therefore, Brüel & Kjaer and the Swedish Mechanics Federation will soon have two systems. The Danish electronics firm and the Swedish organization are, incidentally, our partners in the project so they get MOSES at cost."

Professor C.H. Gudnason characterizes MOSES as a very large and exciting project for the Industrial Engineering Institute, because the hardware is electronics--a field which the institute normally does not operate within in development work. Via MOSES the institute has been in close cooperation with economists, physicists, physicians and ecologists, who have supplied the institute with valuable knowledge for use in further development.

8985
CSO: 3102/322

BRIEFS

THOMSON FLAT-PANEL DISPLAY--Among the variety of new components that Thomson is counting on in 1982, there is a flat-panel plasma display system, the TH 7606 with 512 x 512 cells. Its display capacity of 64 lines of 85 5 x 7 characters or 32 lines of 64 7 x 9 characters is suitable for use on a video terminal. It features rapid access without distortion or fluttering of the characters and graphics. Its memory is unlimited and its brightness can be adjusted. The integrated control electronics can use an underliner and a moving indicator. An optional interface card built around the μP SFF 96802 transforms the panel into a terminal which can be connected directly to a standard data line. Might this panel be the first flat-panel display component, which all the makers of data display consoles have been waiting for, to catch on in the market? [Text] [Paris ELECTRONIQUE INDUSTRIELLE in French 15 Apr 82 p 12] 7679

'MICROMEGA 32' MICROCOMPUTER--Thomson's "Micromega 32" has just been officially introduced. As we indicated last fall, this microcomputer is sold in the United States by the U.S. company, Fortune, in which Thomson-CSF holds 35 percent of the stock. ("We are the only industrial partner," said Jacques Imbert, director of Thomson-CSF's business information and communication systems group). Built around a 68000 with the Unix operating system, the Micromega will sell for a price range from 55,000 francs (128 K 8-bit system, double disk with 800 K 8-bit system) and 160,000 francs (a four-position version). The price includes the programming language and business applications software. Sales will be handled both directly and indirectly through distributors (there are about 20 distributors now) and by the SSCI [expansion unknown], primarily for PME [Small and Medium Businesses] and PMI [Small and Medium Industries] markets. The first evaluation models will be ready in the next few months. Large-scale sales will only begin in September. The Micromega, at the top of the line of microcomputers of the Apple III type, is now being manufactured in the United States. Starting in 1983, it will be built in Brest for the French, African, and Middle East markets, where Thomson-CSF holds exclusive sales rights. The sales target for 1986: 8,000 for France and 4,000 for the export market. [Text] [Paris MINIS ET MICROS in French 26 Apr 82 p 23] 7679

CSO: 3102/311

FRENCH ORGANIZATIONS STUDY EFFICIENT USES OF ENERGY

Paris L'USINE NOUVELLE in French Apr 82 p 149

[Article by D.-M.B. "Rational Use of Energy: A 'Fluidized Bed' for Coal'"]

[Text] Thermal energy perhaps does not give rise to as many vocations as the general concern about "using energy rationally" would at first lead one to believe, because there really are enough men capable of carrying out the research, which is lacking. At the CNRS [National Center for Scientific Research, it is recognized that it is always possible to redeploy personnel. But while transfers from particle physics to solar energy have been possible, they have not been self-evident. And who will volunteer to "go into coal?" The increasing recourse to this energy will, however, require many additional studies.

To begin with the handling of this heavy fuel: In addition to the traditional operations of sorting and crushing, there is the transportation itself. A modern method, totally pneumatic--specifically at Neu--puts coal out of sight of the users, but it still requires additional effort. The use of powdered coal is attracting the particular attention of manufacturers of burner and handling equipment. Objective: lower the power capacity of facilities. Today, only thermal power plants or cement factories can use this fuel in this form.

Another direction of the future: "fluidized bed" solutions. A better mastery of heat transfers and a greater flexibility of operation appear to be imperative before boilers of this type, which are capable of using coal from various sources, become widespread, because, while it is domestic and the supply is certain, coal from mines in the south of France has a very high sulfur content. And except in the case of a powerplant with a 300m-high stack, its use seems to be compromised by the problem of pollution.

On the question of environmental nuisance, CERCHAR [French Coal Board Research Center] is planning to pursue various experiments. A promising theme: sleeve filters which clearly contribute to environmental improvement. At CETIAT [Aerolics Industry Technical Research Center], too, this aspect is giving rise to studies, specifically on the theory of coal use by

gasification or liquefaction. The high temperatures encountered (on the order of 1,000°C) are orienting the choices toward solutions of a cyclone, electrofilter, or even a ceramic system type.

An Attractive Use for the Sun: Cooling

At the CETIAT Research Center at Orsay, too, renewable energy sources are being examined. On the agenda: air solar collectors and windmills.

In order to get started, a bibliographic study has made it possible to count 28 patents for wind use, 27 of which had to be eliminated. One path, which is modern, perhaps, but fruitful, seems to be the optimization of windmill operations, particularly of small ones. In order to use current research better, a COMES [Solar Energy Commission] CETIAT contract provides for data communication of the results of solar facilities. That way, the results will be more complete and more concrete.

At the INSA [National Institute for Applied Sciences] at Lyons, they are also interested in the production of solar cooling: An attractive use for this form of energy, because the absorption machines being studied, which are purely static, would cause no maintenance problems. Their performances should be better known, thanks to two COMES contracts in collaboration with the CNRS.

At Orsay, the study of load losses in the bends of aerolic circuits should lead to a better knowledge of the phenomena of ventilation and bring efficiency gains of 20 to 30 percent. Also being developed: an experimental method for determining air renewal. Using tracer gases, it is applicable to large areas and could lead to better adaption of heating power to real needs.

Among the new materials being developed, heat pumps are receiving special attention: soon an AFNOR [French Bureau of Standards] label, and already a very large investment program at the CETIAT in Villeurbanne for a test bench (more than 4 million for 1981-1982). True energy conservation is realized at this price. Also being studied are condensation heating devices which ensure a maximal use of the heating potential of fuel.

We must not forget a study financed by the MST [Ministry of Sciences and Technology?) involving an inventory of computer codes for exchangers. The objective is to put all the scattered elements at the disposal of small firms, which thus would make it possible to achieve additional energy conservation.

[picture caption] Test of powdered coal and coal-fuel oil mixture combustion in this 1 MW (multifuel pilot furnace at CERCHAR. The increasing recourse to coal will still require numerous studies.

9969
CSO: 3102/283

NEW 1.2 MW WIND TURBINE DEVELOPED IN SWEDEN

Stockholm NY TEKNIK in Swedish 20 May 82 p 4

[Article by Mikael Holmstrom]

[Text] A new wind power plant has been designed in Sweden. The new power plant will be a cross between the first experimental power plant near Kalkugnen and the large power plant erected over the weekend at Maglarp in Scania.

Vindenergi AB is responsible for the design. Vindenergi is owned by Svenska Varv and it also constructed the power plant at Maglarp (see last issue of NY TEKNIK).

The first large wind power plant in Sweden was constructed in 1977 near Kalkugnen. It was built by Saab-Scania and had a turbine diameter of 18 to 25 meters (various turbines were tested).

Government wind researchers ordered the Maglarp and Nasudden prototypes based on experience from Kalkugnen. These two plants will begin operating this year and have turbine diameters of 78 and 75 meters, respectively.

The new power plant designed by Vindenergi has a medium-size turbine diameter of 50 meters.

This power plant is a scaled-down and better designed version of the Maglarp prototype power plant. The power output is 1.2 MW, while Maglarp has a power of 3 MW. The glass fiber turbine will be constructed on the same principles as the Maglarp turbine. The tower also will be similar to the tower at Maglarp. It will be made of steel and stand 50 meters high. The same type of hub will be used as in Maglarp.

One advantage of the new power plant is that it will be easier to transport--the machine house weighs only 28 tons, compared to 150 tons for the Maglarp machine house.

This means that Vindenergi listened to the criticism of the large state-owned prototypes coming primarily from smaller power companies: the prototypes were considered too large and complex. The new power plant is similar in size to

the two Danish plants at Nibe--they have turbine diameters of 40 meters.

"If developments had been as rapid as we thought they would be when we decided to construct the large Maglarp plant, we would have had an enormous head start today. High interest rates in the United States have slowed development and, for this reason, there is a market now for power plants in the 1 to 1.2 MW range," said Nils Byggeth of Vindenergi AB.

It is not yet known what the new power plant will cost.

The new power plant may compete with the plant produced by Danish Wind Technology, which is owned in part by Asea. The Danish plant has a turbine diameter of 28 meters.

In several years there may be a battle for orders on the Danish market and in the United States.

In Sweden there may be a market for wind power plants in this class in the long run--it is primarily smaller, privately owned power companies that are interested.

If Maglarp and Nasudden operate properly, however, the State Power Board and Sydkraft probably will continue to construct the larger power plants.

Kamewa in Kristinehamn which is constructing the Nasudden plant also intends to continue with the larger size. At least no small-scale power plants have been designed in Kristinehamn as yet, NY TEKNIK learned.

9336
CSO: 3102/351

BRIEFS

EXPLOITATION OF BIOMASS--An economic interest group, specifically including the Solar Energy Commission and the French Petroleum Institute, will be formed very shortly for the construction and operation at Attin (Pas-de-Calais) of a demonstration unit for the butyl acetone fermentation-distillation process from mangel-wurzel and Jerusalem artichokes. The alcohol production capacity of this unit is to be 10 tons a day. In another context, the Solar Energy Commission has published the list of equipment selected for the energy exploitation of animal wastes by methanization on which are found, among others, the names of Air Liquide and PEC-Engineering. [Text] [Paris CHIMIE ACTUALITES in French 12 Mar 82 p 1] 9969

CSO: 3102/259

BELGIUM BOASTS ONE OF EUROPE'S MOST MODERN STEEL PLANTS

Paris INDUSTRIES & TECHNIQUES in French 20 Apr 82 pp 59-61

[Article by Jacques Houbart]

[Text] Not long ago, industrial clusters or "konzerns" were a sign of power and a symbol of success. Today, with the world-wide changes in industry and the threat of unemployment, many sectors are closing ranks in defensive concentrations. This is true of the Cockerill Sambre steel mills, one of Europe's leading steel industries, which since June 1981 has been concentrated in the two poles of Charleroi and Liege. And yet, the plants which make up this complex are the sixth leading producers in the EEC: 6,875,000 tons of steel; of this, 3,525,000 tons comes from the Liege region, and 3,350,000 tons from the Charleroi region. It also accounts for 78 percent of the steel used by the Community. Nonetheless, most of Belgium's steel facilities are not at all outdated, being actually quite modern. The Carlam rolling mill is the newest and most modern in Europe. Its capacity, if the EEC and Nippon Steel will allow it, should even rise from 1.7 million tons to 2.6 million tons. And the new Valfil wire mill, whose production capacity is 1.15 million tons, is the largest in the world, and one of the most modern.

But the current capacity and performances are not what really count. The Belgian steel industries are not afraid of future shock, but rather of the shock of foreign steel. Ever since World War I, the steel industry has developed on several continents. Today Japan has the steel industry with the top performance in the world, and the PVD [Developing Countries] are beginning to export. They do have several points in their favor: the expansion of national needs, the low cost of labor, and the abundance of local ore or of local energy resources. Brazil, India, Mexico, South Korea, and Argentina are already heavily involved in steel production.

Since 1960, worldwide steel production has more than doubled. To the problem of the overproduction of low quality steel has been added the severe crisis in the automobile and construction industries. Of course, worldwide steel demand is enormous, but a Malthusian sort of reflex has kept the industrial countries from building housing, automobiles, and the electric power plants which are essential for the development of so many countries. For example, in Belgium the EEC's plan, which is based on a Nippon Steel study evaluating the possibilities of steel sales, calls for reducing the steel production capacity from 11.2 million tons to 8.5 million tons.

More Economical Castings

As it is not up to Cockerill's engineers to unravel this situation, the group's directors have chosen the only strategy possible: the development of technology, of research, and of diversification. Cockerill Sambre does have some effective arms in this area, and its research and development labs are working feverishly.

Just a few weeks after the new concentration, the board of directors approved a plan for the installation of three new continuous casting lines: one slab casting system at Chertal; one mixed slab and bloom casting system at Seraing; and one mixed slab and bloom casting system at Marcinelle. This continuous casting system is already familiar to Cockerill Sambre, and it does increase productivity. Using this process, it is possible to go directly from liquid steel coming from the casting ladles of the steel mill to the slab, which is a flat semi-finished product obtained by the first rolling of an ingot heated in pit furnaces. The slab is then ready to be placed in the rolling mill in wide strips.

The continuous casting process avoids the necessity for casting in ingot casting molds, cooling, and unmolding of the ingots, then their reheating in pit furnaces and rolling in slabs. It does save materials (no more metal losses in molding and unmolding theingots and no more losses in the fire of the furnaces), and it is a highly energy-efficient method.

While high performance steel mills often have continuous casting systems, some new and absolutely unique technologies are being developed by Cockerill Sambre. About 18 months ago, the group successfully started the application of a new continuous annealing process for cold-rolled sheets. This is done at the old

galvanization line no 1 at Phenix Works, which is a wholly owned Cockerill Sambre subsidiary. This process, which is called HOWAQ [Hot Water Quenching] is patented by the CRM [Metallurgical Research Center]. The reason why the sheets of steel can be cooled by water at a temperature of 100°C is that they were first heated to 700°C.

Steel's malleability is of particular interest for manufacturing car bodies, so this process is of great interest to the automobile manufacturing industry. During the precipitation of carbon atoms at the time of cooling, these atoms, instead of remaining trapped in the iron crystal, form small crystals scattered throughout the mass of the steel and do not decrease its ductility. One of the advantages of the CRM-Cockerill procedure is that it reduces the time period of precipitation to 40 seconds.

The HOWAQ procedure has much better performances and is more economic than procedures under study by the Japanese (gas blasting by Nippon Steel and the cold water blast system of Nippon Kokan). In order to harden steel, additives are placed in it at the steel mill. These additives are expensive, and by using the HOWAQ procedure, high resistance steels with a minimum of alloys can be produced. Moreover, the HOWAQ procedure, during which a strip of steel with 110,000 calories per ton is immersed in boiling water at 100°C, produces steam. And each kilo of steam condensing at 100°C provides 540 kilocalories to a colder body. This steam can be used to heat a fluid which could power a turbine. For a HOWAQ continuous annealing line with a capacity of 500,000 to 600,000 tons per year, it has been calculated that the power of the small electric power plant it could operate could be about 3 megawatts!

The HOWAQ process is an advantage for the European automobile industry, since it produces sheet steel that is easier to roll and decreases the weight of cars. The steel is thinner, while still maintaining the same rigidity and the same resistance to corrosion. Another method, developed at Cockerill by Phenix Works, is also attracting some interest from the automobile industry. This is a type of galvanization, which is so valuable in protecting car bodies, which are particularly prone to damage from the salt spread on roads during winter. Standard galvanization, which is done by circulating the steel to be protected in a zinc bath, produces a zinc coating on two surfaces. This is troublesome for automobile bodies, as it causes problems when welding the steel.

Moreover, a zinc coating on the surface to be painted is not wanted by the automobile manufacturers, for it causes some difficulties when preparing the surfaces. Rust acts to destroy car bodies from within, so why not try galvanizing just one surface? For this reason, Phenix Works has developed a unique process which has completed very satisfactory tests. The method was developed by a team working under V. Polard.

In this process, the steel strip is no longer submerged in a molten zinc bath at 450°C, but one surface rests on a cylinder that rotates in the zinc bath. The other surface of the steel never comes in contact with the molten zinc. This application may also be extended to coatings other than zinc, and may be of use in some other sectors, such as household applicances or metal packaging.

The Japanese industrialists are very much interested in the research being done at Cockerill Sambre, and are happy to make the trip to the shores of the Meuse. Still, we must hope that the EEC--which can certainly show its energy when it's a matter of limiting its production--will be daring enough to intervene to protect this innovative effort of the Community.

The concepts of technological transfer and diversification also motivate the staff of HS Innovations. These steel industry development units have played a major role in the development of the improved nozzle for an OBM converter which lengthens the life of nozzles, thus reducing steel production costs. This new product, which was invented at Charleroi, has been purchased by Usinor, and some other steel industries are also considering it. HS Innovations is also handling the Carmaid operation, oriented toward diversification.

From 12.5 Hours per Ton in 1975 to 6.7 Hours per Ton in 1980

The Carmaid is a small but very high performance loader, which can be used for difficult industrial handling procedures, such as agriculture, horticulture, and animal breeding. It is easy to handle, compact, sturdy, and stable, and works in an area as small as 40 cm. It is a sort of "maid of all work" which goes in places where other machines can not fit. It is the only hydrostatic transmission device with a hydraulic servo-system equipped with a wheel-driven motor. This means that mechanical transmissions and their attendant problems can be eliminated. The Carmaid can handle loads of 700 to 900 kg, and on rail, can pull a load of 40 tons.

If technical progress is all it takes to get around the dangerous turning point that Cockerill has reached, the "Cockerillians" should be hopeful. Their productivity rose from 12.5 hours per ton of finished products in 1975 to 6.7 hours per ton in 1980. There has been a strong emphasis on quality, and the equipment of the quality research service goes far beyond the standard equipment of any modern metallurgical laboratory. This avant-garde service also manages the ESR [Electro Smalt Remelting] facilities. These provide very high quality alloy steels for defense, for the nuclear industry, and for cold-milling cylinders.

7679
CSO: 3102/310

RENAULT SAYS RVI FLEXIBLE WORKSHOP MORE ADVANCED THAN OTHERS

Paris LE FIGARO in French 6 May 82 p 11

[Article by Vincent Gerard]

[Text] The workshop covering 3,000 square meters is light and not very noisy for a facility of this type. On the wall is a huge mural painted in bright colors: circles, triangles, geometric shapes representing gears. The workers, who were offered a choice among 12 designs, chose this one. Everywhere is the smell, getting into clothes, caused by the blend of oil and water used to keep the parts being machined at high speeds from overheating.

Self-propelled carts guided on the floor by an almost invisible wire move around slowly in a stunning ballet, bringing their cargo to the machine tools. A clever device hidden away in the computer room controls traffic: there will be no accidents here. The carts yield the right of way, and then pass, or if they have nothing to do, they stop in rest areas.

This is the most spectacular part of the RVI [Renault Industrial Vehicles] flexible workshop at Boutheon, located in the suburb of Saint-Etienne. But it is not the most important. What matters is not the carts moving around, but the constant use of the machines. At any moment a computer can direct the right part on the right cart to the right machine. So there are no piles building up here, unlike other workshops, where parts clutter up the shop while waiting for a machine tool to be free. This is what makes the Boutheon flexible workshop the most modern in the world.

This isn't a sort of swaggering nationalism; it is a reality which is made clear by comparison with foreign developments. Catherine Dupont, the CNRS [National Center for Scientific Research] staff member who developed the entire system, explains:

"At Fujitsu-Fanuc in Japan, the flexible workshop has only two carts and the loading and unloading of parts on the machines is done manually. At Boutheon, this operation is automatic. And again in Japan, at Murata-Machinery, the parts are loaded automatically, but the system isn't operated in real time. Operators have to decide which parts to put on the machines that are free."

"In the United States," she continued, "Cincinnati Milacron has a flexible workshop, but it is a demonstration unit, and isn't operational like the RVI. Messerschmitt in Germany has a flexible workshop that machines parts for the Tornado plane, but it uses workers to clamp the parts on to the machining centers. And in Italy, Camau, a Fiat subsidiary, has two assembly plants that they claim are flexible. But there the body part is attached to the carts, and the operations are not done in real time."

On this basis, the Boutheon workshop may be considered a worldwide first in the field of machining. It has managed to reconcile two contradictory requirements: diversity and large-scale production. Industrialists know quite well how to produce a large number of identical parts with excellent productivity. And they also know how to manufacture highly diversified parts, but at the cost of a terrible productivity rate.

In the flexible workshop, these two parameters can be combined. The basic principle of this type of shop is very simple: when a machine says it is free, the management system automatically determines, from among the group of parts to be made, the ones that are at the right point for this machine. Of these, the best part is selected, based on priority rules set in advance.

The Boutheon plant is now producing gear systems for heavy vehicles. The flexible workshop machines crank cases for new gear systems of a type that had been imported earlier. The investment was 45 million francs for this facility.

7679
CSO: 3102/293

RENAULT FLEXIBLE WORKSHOP OPERATES IN REAL TIME

Paris L'USINE NOUVELLE in French 6 May 82 pp 66-67

[Article by Patrick Piernez: "A World First at Renault"]

> [Text] After the United States, Japan, Germany and Italy, France has just entered the very closed circle of users of flexible workshops. The one which Renault Machine Tool Company has just completed for Renault Industrial Vehicles constitutes a world first by virtue of its level of automation and its management of production in real time.

Renault Machines-Outils [RMO--Renault Machine Tool Company] made an ambitious bet: to profit from its lag by skipping 2 generations and developing a computer program capable of using the flexibility of its carriers to make the right decision in the workshop at all times. Renault won its bet...

This achievement, followed with great attention by foreign experts, will to a large extent open to France the European market for flexible workshops. Everyone has been waiting until now to see the Boutheon workshop in operation before deciding. In France alone 15 flexible workshop projects are the object of commercial negotiations in the fields of aeronautics, shipbuilding, mining equipment, valve production, electrical construction, weapons, bicycles...

The decisions were not long in coming: In less than a month RMO "pocketed" two orders for flexible workshops--one for Messier-Hispano-Bugatti in Molsheism and the other for Caterpillar in Grenoble. In this market RMO can now compete effectively against the other European builders, such as Burkhardt-Weber or Heller in Germany, or Comsu and Olivetti in Italy. The national enterprise is also scoring points over other French challengers, such as Automatique Industrielle [Automatic Industrial Plant], an affiliate of the Societe Generale [General Production Company] and PSA [Peugeot-Citroen Company], which is now building a flexible workshop in Meudon for Citroen.

Claude Billaud, manager of RMO, is showing a certain satisfaction with this success, even though it is somewhat tempered by prudence: "We do not anticipate a sharp increase in sales. The share of flexible workshops in our machine

tool operations should grow steadily without for all that exceeding 15 percent in the next 3 years." This is nevertheless relatively significant figure when one realizes that machine tool activities account for some 680 million francs out of a total 1.4 billion in turnover at Renault Industrie Equipement et Techniques [Renault Industrial and Technical Equipment Company], which also includes the Renault group's "robotics" and "engineering goods and services" operations.

Investments Which Must Be Divided

This prudent approach is explained in part by the cost of installations (that of RVI [Renault Industrial Vehicles Company] totaled 45 million francs in 1979), leading the users to divide their investments. The principle is familiar: A workshop is planned in several stages; with the following advantages: a staggering of investments, greater facility in startups and adaptation of production to the needs of the market. That is what has been realized by Messier-Hispano, where only two machines out of five have been ordered, but also by RVI Boutheon, where an extension is planned to meet the growth in demand.

The RVI workshop Boutheon was designed to produce the crankcases of RVI's new top-of-the line item, the B-9 gearbox. This synchronized mechanical gearbox (10-speed gears) is slated to equip 220- to 400-horsepower freight trucks and tractors. This product is the result of 7 years' research at RVI, which has great commercial hopes for it. A total of 75 units were tested over a distance of 600,000 km. The gearbox will replace three other models: An RVI model, but also two foreign models which have so far been imported (the ZF synchronized gearbox and the Fuller high-torque gearbox).

This gearbox has three elements: the principal crankcase, the intermediate crankcase (in gray cast iron), and the rear cover made of aluminum alloy or GS cast iron, depending on whether it is used as a simple cover or suppoert for the electromagnetic decelerator. Thus, there are now 4 different elements and later, when the RVI produces all the variations, there will be 12 to 16. Similarly, production, now limited to 25 gearboxes a day, will gradually increase to 70 a day with a 3-shift operation. In 1983 additional investment will raise production to 100 gearboxes a day. "It is this adaptability of use which justified our desire to acquire a flexible workshop," Andre Morel, manager of the Boutheon plant, explained. "This workshop will constantly adapt to our needs with an equipment utilization rate close to 80 percent, whereas it is known that after 15 years of service some assembly lines no longer operate at more than 20 percent capacity."

Another determining advantage of this flexible workshop is the complete elimination of the need for adjusting settings in order to change from one product line to another. This makes it possible to work in direct flow between manufacture and assembly and thus to eliminate inventories. "On our old assembly line we needed 17 hours to change from one element to another. We thus produced sets of 1,500 units that we stored before assembly. Today we no longer have inventories: A few seconds are sufficient to change elements. We manufacture units gradually, as the need arises. Better still, in the future the workshop will be able, with less than 4 hours needed for adjustments to produce a second, different gearbox.

This flexibility of adaptation to the product is accompanied by a flexibility of reaction to equipment breakdowns. "In case of the lengthy breakdown of one of the machines, the computer activates emergency equipment making it possible to work the units either on a piece of equipment of the same type or on a production unit, whose memory core is programmed with finished units--for example on the reaming-straightening piece of equipment," Claude Billaud explained.

A Decision by the Computer Every 6 Seconds

This flexibility of adaptation is enhanced by the use of carriers guided by wires sunk in to the ground. The elimination of rails and roller-assisted conveyor belts makes it possible to move the pieces about with unequaled speed. This technique has just been adopted in the most recent plant construction projects around the world, such as Messerschmitt in Augsburg, or Fanuc or Murata in Japan. "But Renault alone has pushed automation so far," Catherine Dupont of RMO noted. In the Boutheon workshop the units are not only moved from one piece of equipment to another, they are also loaded and unloaded automatically. Furthermore, the electric carriers do not require any manual operations in changing batteries."

However, the great pride of Catherine Dupont (who is also a researcher at the CNRS [National Center for Scientific Research] is control in real time. "The computer makes a decision every 6 seconds. It anticipates the timely feeding of supplies to the machines as they run out, but it also allows an individual piece to be worked on a priority basis and relieves bottlenecks." This is an indispensable answer to the problem of eliminating stock pileups and waiting lines in this workshop where production time takes between 1 and 9 minutes...

The data-processing center includes two Solar 16-40 (SEMS) units with a power of 128 K hooked up to a "black box" indicating all the operations effected during the last 40 minutes: It is a precious tool for the personnel charged with insuring the progress of the manufactured items.

Since 1980, the plant has created 100 jobs and assigned 15 workers to startup operations and the programmed assembly of this new tool. The workshop functions with five technicians per 8-hour shift. They are assigned to the loading and unloading of units on the pallets, maintenance, followup chores at the workshop, and the setting of adjustments for the tools. For their training Renault "went all the way," including 10,000 [as published] hours of training (in digital controls, programmable robots, industrial data-processing and maintenance).

How Renault Won Its Bet

The Boutheon workshop is highly complex. It includes four Graffenstaden production centers, three special SMC [Mechanical Company of Castres] drilling and reaming machines, and eight SEIV wire-guided carriers.

The first difficulty which Renault experienced was to have working a large number of specialists from various disciplines, who were within the group (with the SMC, SEIV and SMC Programmable Robots) or outside it, with SODETEG

[Technical Studies and General Enterprises Company] (the computer program of the conveyor system), CERCI [Industrial Company for Cybernetic Studies and Projects] (central data-processing), NUM (digital controls), SEMS [European Mini-Data-Processing and Systems Company] (computers), and so on. But it is neither this difficulty nor that of the computer program (to everyone's surprise, the software worked flawlessly) which caused the greatest headache to Renault's engineers. Rather, it was two mechanical problems which were stumbling blocks in the project.

The first difficulty: the placement of the units on the pallets in such a way as to leave free access to the four sides to be worked. At the time of the tests, the pieces became deformed and were not up to standard. The margin of variation allowed is very strict: 2/100ths millimeters on the locating interaxles spaced 300 millimeters apart. It was necessary to optimize the assemblies of the gears of the pieces and give extreme care to the "balancing" of the unit before it was machine finished. The second difficulty was the unevenness of the ground. The workshop was built on a landfill site which became very uneven with time. And the absence of level ground hindered the development of the wire-guided carriers. The problem was solved thanks to the cunning of Renault's engineers: The wheels of the carriers were raised higher on one side and a control system for meshing the pallets on the machines was installed.

2662
CSO: 3102/285

FRENCH COMPANIES EXHIBIT LATEST MACHINE-TOOLS AT PARIS SHOW

Paris LE MONDE in French 12 Jun 82 p 40

[Article signed R.C.: "The 12th Biennial Machine-Tools Show. The Promises of French Robotics"]

[Text] The 12th Biennial Machine-Tools and Mechanical Equipment Show opened on Wednesday 9 June in Paris, at Porte de Versailles. Mr Pierre Dreyfus, minister of Industry, was to inaugurate it on Friday 11 June.

Until 17 June, 89 companies will exhibit their robotics products. Simultaneously, the International Industrial Robotics Conference is being held from 9 to 11 June.

At the opening meeting, Mr Pagesy, representing Mr Jean-Pierre Chevenement, minister of Research and Technology, gave some indications on the work of the robotics mission which should soon present its conclusions. The future program of the Ministry aims at:

- strengthening the advanced automation and robotics (ARA) program;

- organizing and energically promoting the production of sensors and motors for second-generation robots;

- providing orientation and support for activities dealing with real-time data-processing and flexible workshops;

- organizing concerted activities dealing with mobile robots for industry and agriculture;

- promoting efforts in the field of automatic quality control;

- organizing research programs on the effects of automation on the economy, on working conditions and on employment.

"The work of commissions will not create the robots we need, but manufacturers will." This remark of a marketing survey expert is a good illustration of the situation of the French robotics industry. There is still more talk than action, but maybe not for much longer. At any rate, this is what the exhibition now held at Porte de Versailles seems to prove.

Thus, CEM (Electromechanical Company), a subsidiary of the Swiss Brown-Bovery group, exhibits components for machine-tools and robots (motors, actuators and electronic components) which have been used for several years by world robotics leaders such as the Swedish ASEA [Swedish General Electric Corporation] and the German Volkswagen. Its subsidiary in robotics, SCEMI (Industrial Equipment Design and Manufacturing Company), is showing an assembly robot developed with the assistance of the Grenoble Applied Mechanics Laboratory, assembly transfer lines and... a Japanese robot, Yaskawa. A company in full growth, SCEMI is one of the assets of the future French robotics program. At present, it employs 70 people and is due to move soon to a new location at Bourgoin-Jallieu (Isere).

At the Citroen-Engineering booth, the Peugeot SA group is showing, for the first time in Europe, a CAD (computer-assisted design) robot control. A spot-welding robot designed by Talbot will be programmed in the interactive mode using a Computervision console. Until now, a robot could be programmed only instruction by instruction, i.e. the motions of a human operator were recorded and the machine was programmed to reproduce them. With CAD, human intervention is no longer necessary.

Other companies are showing interesting equipment and methods. Among them, Renault, SORMEL [Company for Mechanical and Electronic Horological Studies] (a subsidiary of MATRA [Mechanics, Aviation, Traction Company], AFMA [expansion unknown]-Robots, a joint subsidiary of Leroy-Sommer and Telemecanique), CSEE (Electrical Enterprises and Signalization Company), which exploits General Electric patents and, after remote-control manipulators for heavy loads, is now getting into oil-well and nuclear equipment).

For its part, AUXILEC [expansion unknown] (Thomson-Brandt group) is showing at Porte de Versailles only models of the equipment it has developed (robots for the assembly of parts weighing from a few grams to several kilograms).

The CEA Enters the Competition

CGE (General Electric Company), which possesses knowhow in mechanical engineering, automatic control and engineering, is also represented by its subsidiaries. One of them, CGMS (General Handling and Storing Company), has developed automated machines which will be used as a basis for robotics products; another, Workshops and Work-Sites of Brittany, has specialized in robots for operations in hostile environments (off-shore drilling, nuclear industry). Let us recall that, for a few months now, CGE has been marketing small Japanese robots in order--according to its management--to test the market.

The Atomic Energy Commission (CEA) should also reveal soon its ambitions in the field of robotics. If it is given a "green light" in the budget, it should announce the creation of one or several subsidiaries jointly with a large

national industrial partner. The CEA's work in robotics deals mainly with the following: arc-welding, laser machining and heat treatment, assembly.

Association with the Japanese?

Are the French manufacturers and researchers in a position to develop a national robotics industry or will they have to sign cooperation agreements with foreign manufacturers? The question is not yet decided. Certain groups have taken a decisive step and associated with the Japanese. CGMS [expansion unknown] is marketing the Skylam assembly robot produced by Sankyo (the very same robot that IBM recently decided to import into the United States) and has already sold 26 of them, as well as a Tosman-machine loading and unloading robot manufactured by Toshiba. The AB [expansion unknown] have signed an agreement with Osaka, the Commercy Wireworks and Workshops with Shin Meiwa. Manurhin is contemplating an agreement with another Japanese, Fanuc, but it seems that neither its principal shareholder, the MATRA group, nor the public authorities are favorable to such an association, especially since MATRA plans to develop its operations in this sector.

As far as "bottom-of-the-line" robots are concerned, certain officials feel that we should recognize our deficiencies and import until we have created companies powerful enough to enter the market with competitive products. This "realism" is reflected in the recent relaxation of certain financing procedures involving bonus loans for the purchase of imported materials. However, when it comes to "top-of-the-line" products, the same officials believe that France is in a favorable position, which explains, for instance, why CGE is basing its strategy on this type of equipment and imports simpler machines. The French manufacturers of manipulators are far from sharing these views.

To import "and see," and wait to develop our own products presents a definite risk. If we help competitors like Japan to gain a foothold in France, what will happen when that country--which at present exports very few robots but uses them to manufacture low-priced consumer goods with which it floods our markets has completed the automation of its factories and begins to exports robots too?

9294
CSO: 3102/348

PLAN TO STRENGTHEN MACHINE TOOL, ROBOT INDUSTRIES OUTLINED

Paris ZERO UN INFORMATIQUE HEBDO in French 17 May 82 p 32

[Article by Jean-Louis Cousin]

[Text] "When I say that no sector is doomed, this is based on the potential offered by automation." A few weeks away from the publication of details about the contents of what is already being called the "robotics plan," Pierre Dreyfus, the minister of industry, last week addressed leaders of the machine tool sector on the subject of the government's major options in this field. His colleagues also gave the industry representatives some information.

These exchanges between government officials and industrial leaders were part of a program called "Automation and the Machine Tool Industry in Ile de France," held at the initiative of the prefect of Paris, Lucien Vochel, and of the regional council, chaired by Michel Giraud. What was said there, added to what was already known, gives us some idea of the forthcoming "robotics plan."

Increased Funding

On the subject of financial incentives for the domestic market, Pierre Gadonneix, the director of metallurgical, mechanical, and electrical industries at the ministry of industry, made the following points:

The envelope of funding approved for robotics definitely increased in 1982 in relation to 1981, reaching 2 billion francs (compared with 1.2 billion last year).

There has also been an increase in the resources allocated for the MECA [Advanced Design Materials and Equipment] program, designed to encourage the acquisition of such equipment: 540 million francs from 1982 through 1984. "This is a sextupling of funding in a 2-year period," said Mr Dreyfus.

The formation of a financing company specializing in the area of machine tools and robotics is to be studied. This could receive a significant portion of the robotics funding envelope.

In addition to these financing measures, two other types of stimuli are planned for the domestic market.

a. A more active policy of public orders, particularly from the ministry of education, the AFPA [expansion unknown], the military arsenals, etc.

b. The establishment of a regional infrastructure providing assistance and advice for companies, known as ADEPA [Agency for the Development of Automated Production]. Its purpose will be to promote the introduction of automated materials in industry, particularly in PME [Small and Medium Enterprises]. It will expand its regional facilities in order to establish closer contacts with the PME. According to the ADEPA's director, Christian Sauvaire, it has about 100 engineers and technicians, and plans to open about 10 centers over the next few months.

These measures to provide a domestic stimulus are only one aspect of the total plan, which also calls for a reorganization of the sector, designed to form competitive units (both for machines and their componenets), and includes a training policy and the introduction of a technological innovation program.

Research Quintupling

It was reported that the research and development program will be multiplied by 5. Development spending by industry will rise during the 1981-1984 period from 50 to 200 million francs. The collective research program of technical organizations and universities will be of the same magnitude.

Three technological poles, each with a special focus, acting as coordinators for scientific organizations by means of goal-oriented research, are to be established. One will be centered around the CERMO [Machine Tool Study and Research Center] and the ENSAM [National School of Arts and Industries], the second around the ADEPA, and the third around the CETIM [Mechanical Industries Technical Center].

In their research and development programs, the machine tool companies will be encouraged to use the resources made available by these technological poles.

Quadrupled Production

Speaking of robotics, Pierre Dreyfus noted: "Over the years to come, our capital goods industries will have an opportunity to grow stronger because of the machine tools of the future, robots. This increased strength will first have to come about in the domestic market. That is why, in each of the plans which I have presented for particular sectors, we have included a development of the capital goods for that sector. Our industrial policy is based on systems which include in the same logic both the equipment used and their products."

The minister gave some information about the government's role: "All the functions of industry will be modified, and the government does plan to increase its role as an advocate of automation. It will do so by means of several effective procedures: the CODIS [Committee for the Development of Strategic Industries], whose "robotics" is one of the priority areas; the dissemination of innovation by the Data Processing Agency; and the MECA procedure."

Michel Courtois, the leader of the French Machine Tool Builders Union, remarked that the average age of French machine tools is now 15 and 1/2 years. Only 20 percent of the machine tool stock is less than 10 years old, compared with more than twice that in the United States, and nearly 2/3 of the stock in Japan. About 56 percent of the PMI [Small and Medium Industries] in France have no automated equipment at all.

The inadequacy of our stock of digitally-controled machine tools was pointed out: under 10,000 units, while the Federal Republic of Germany has 30,000, Japan 50,000, and the United States, 70,000.

The plan calls for quadrupling their production, increasing their share of production from the present level of 27 percent to 60 percent in 1985. And the total production of machine tools itself should double from its present level. At the same time, the national stock of digitally-controled machines should be increased to 26,000 units. At present, about 15 businesses are now about to award contracts, so they can become poles for development, by means of commitments made in specialization, standardization, research, training, and increased sales volume.

7679
CSO: 3102/303

ASEA PLANS ENTRY INTO JAPANESE ROBOT MARKET

Stockholm SVENSKA DAGBLADET in Swedish 2 Jun 82 p 27

[Article by Lennart Utterstrom]

[Text] The Swedish industrial robot manufacturer Asea is planning an invasion of Japan. This was stated by the large Japanese newspaper ASAHI SHIMBUN in a front page article. According to the newspaper, this could result in a robot war in the "promised land" of industrial robots.

It is not without newly awakened astonishment that Japan's Industrial Robot Association views its Swedish competitor who now plans to capture part of its market and also begin local production of high-quality robots in the mid-price range.

The manufacturers in Japan are "extremely concerned for the Swedes, since no on believes that Sweden can sell industrial robots in Japan in the foreseeable future . . . ," wrote ASAHI SHIMBUN which has a daily circulation of about 11 million.

Unknown Partner

Asea's plans, which have been known for some time in Swedish industrial circles, include a first stage in which Swedish manufactured robots would be sold and a later stage with local production in cooperation with a Japanese partner. It has not yet been revealed which company intends to cooperate with the Swedes--to the great disappointment of the Industrial Robot Association. The concern and curiosity now have gone so far that an American detective firm has been hired to discover the identity of the mysterious partner!

While Japanese robot manufacturers beat their breasts and claim that they produce more artificial workers than any other country, they also express a certain amount of genuine admiration for the Swedish company. ASAHI SHIMBUN goes a step further and writes " . . . we must admit that Asea's robots are extremely advanced and skillful. They are not just strong . . . they also are capable of accomplishing more tasks than a corresponding Japanese robot . . . "

The newspaper also quotes Uedasan, head of Asea's local industrial robot division. He stated proudly that "Sweden is the top producer of robots. Many Japanese products imitate us, but we are best with regard to both intelligence and strength . . . "

Site Already Purchased

If the American private detectives fail to solve the mystery before mi-June, they will have a difficult time justifying their fee. Since early April a small Swedish delegation has been negotiating a contract that will be made public in June. An industrial site already has been purchased in the Kansai region--Osaka-Kobe-Kyoto--and within 2 years a factory will be built, initially for assembly only, but later for complete production.

While Asea is the largest industrial robot in Europe, Japan has been the world's largest manufacturer for just over 3 years. There are a total of about 150 companies in the business--most of them small, but several industrial giants such as Kawasaki Heavy Ind., Hitachi, and Yasukawa also have entered the picture.

During the past year, competition for both the domestic and the export market has increased in intensity. Accusations and counteraccusations concerning dumping often are heard. Now the efforts of a foreign company to enter the Japanese market, a company with admittedly better products, are the cause of general concern. If the rumor is correct that a large American company plans to enter the Japanese market within a year or so, it is probable that many small Japanese manufacturers must start looking around for new products.

One Yasukawa executive stated with concern, "We are worried and want to know what prices the Swedes will ask and which Japanese firm they will work with."

"We must now develop our own robots and also reduce costs. This is the only way to compete," said Yoshino Komori, secretary of the Industrial Robot Association.

9336
CSO: 3102/323

BRIEFS

AEROSPATIALE, TMI TECHNOLOGY TRANSFER--Aerospatiale's production research department has designed and developed a fluid-blast punching machine for composite materials, featuring digital control, as part of its technological research program. Because of the technical and economic appeal of this procedure and the good performances of the equipment, TMI [Technical and Industrial Mechanics Company] wanted to purchase the construction and marketing rights for this device. Mr Millara, Aerospatiale's vice president for industrial and technical affairs, and Mr Vitrat, president of TMI, on 6 April 1982 signed a licensing agreement giving the French firm, TMI, which is well known in machine tools, the right to put on the international market a device meeting the needs created by the growing use of composite materials. The agreement will also give Aerospatiale a substantial profit, helping to offset its spending on technological development. [Text] [Paris AFP SCIENCES in French 15 Apr 82 p 38] 7679

CSO: 3102/293

SCIENCE POLICY

FRANCE'S STRATEGY FOR ELECTRONICS INDUSTRY ANALYZED

Paris L'USINE NOUVELLE in French 20 May 82 p 214

[Article by Robert Clarke]

[Text] The report of the "electronics mission" headed by Abel Farnoux, who is now deputy director of France Cables, has just been partially released. This is a greatly abridged version (the entire report takes up about 10 thick volumes) which was presented officially within the last few days. This is the nth plan to revitalize our sagging French electronics industry, which has been chasing its own shadow for nearly 30 years now.

The Farnoux plan, an ambitious proposal based on an overall strategy and backed by political determination, will be considered by the council of ministers over the next few weeks. It already seems to have the support of the ministers of research, posts and telecommunications, and industry. The unique feature of this plan is its determination to advance in all directions at once, by means of "national projects" bringing together the private, nationalized, and public sectors, scientists and businessmen, users and union members.

The intent is to bring France closer to the two giants of the electronics industry, the United States and Japan, by doubling the French market between now and 1990, by increasing research by 50 percent, restructuring the development program, and bringing together the maximum number of people of good will, under the guidance of strong project leaders handling boldly innovative programs in all areas, from components up to products with a mass public appeal.

The Farnoux plan will rely on a major manpower effort; over a 3-year period, it calls for training about 1,000 top-level engineers, 10,000 additional technicians, and establishing new advanced electronics schools which would combine data processing, office automation, and automation. One of these schools could develop around the present INRIA [National Institute of

Data Processing and Automation Research] at Rocquencourt, another at the LAAS [Automation and Systems Analysis Laboratory] in Toulouse and the IMAG [expansion unknown] in Grenoble.

To guide this new system, and instill in it a political focus, the report suggests the establishment of a secretariat of state for electronics. The socialist plan was even more ambitious: it called for a ministry of information and communications, which would have had responsibility, in addition to the PTT [Posts and Telecommunications], for the entire data processing and audiovisual industry. In the records of the socialism and industry colloquium held in 1980 there can be seen the themes of a struggle against domination by the multinationals and support for French mastery of basic technologies.

This is what the Gaullists wanted in 1966, when they tried the Computer Plan operation, after the annoyance of the United States' refusal to deliver to France a powerful computer which was to be used to help develop a hydrogen bomb. Once again, military research was the point of departure for an operation destined to create a large national computer industry in France. The advocates of this plan imagined scientists, industry, and bureaucrats all working together. Between 1966 and 1974, the government spent 1.8 billion francs on data processing, but industrial rivalries and the lack of any clear political determination caused this grandiose plan to partially abort.

It wasn't a CII-Honeywell-Bull alliance, the pet project of Michel d'Ornano, that would reestablish the independence of the French information industry; a European solution had collapsed, and French industry was unable to make use of the government's somewhat confused intentions in this area. The major problem was that the strategy was one thing after another. They were trying to develop a "national" computer without a components industry. They had to improvise, trying a number of "components plans," in an attempt to regain terrain that had been won much earlier by the Americans or the Japanese.

The existence of nationalized companies which have real possibilities of playing a coordinating role in the field of electronics now gives the socialist government a new chance of succeeding in what had always failed before. The alliance of Thomson and the research centers of the PTT and of the former ORTF [French Radio and Television Office], like the one in Rennes, may become a reality, while such an occurrence was unthinkable earlier. It still remains to be seen whether this government prompting will be followed in any effective way by

the rest of private industry and if a really national movement will be enough to attract European partners. For who could imagine any true competition with the United States and Japan unless on a European scale?

We should not have too many illusions: this ambition is going to be very expensive. It took the Japanese a lot of money to compete with American industry. The Farnoux report is counting on the synergy created by the protagonists involved and on a commercial recovery in order to provide the 10 billion francs needed without too much hardship. A meeting is to be held within the next few weeks at the INRIA headquarters in Rocquencourt, bringing together the future partners in this new version of France's electronics ambition. They should be encouraged by the government's affirmation of the top-level interest being shown in this effort, in terms of both manpower and financing. It isn't so much a matter of getting ahead of Germany and replacing it as the "third big name" in electronics, but rather of moving ahead and coming closer (with our European partners) to the United States or Japan than we are now.

The issue is a vital one, and the ambition is something to take pride in. It does remain to be seen if we will be able to handle this policy promoting development in all areas at once. It is a matter of choices that must be made. One more choice...

7679
CSO: 3102/311

STELTZER ENGINE HAS ONLY ONE MOVING PART

Stockholm NY TEKNIK in Swedish 20 May 82 pp 18-19

[Article by Fredrik Asklof]

[Text] As few moving parts as possible.

This is the main concept of a new type of engine developed by a German inventor.

The engine consists of only eight parts. Only one of these moves.

Frank Steltzer of Frankfurt has worked on his invention for 20 years. He plans to revolutionize engine construction with his "engine without mechanics."

"I will not quit until all conventional piston engines are past history," he said.

Actually, however, Steltzer's engine is not a new invention. A Spanish engineer was granted a basic patent on a so-called free-piston engine as early as 1934 and Frank Steltzer has developed this idea.

The free-piston engine already is used today in gas generators in turbine-driven ships, for example.

In addition to the small number of parts, the Steltzer motor is characterized by the stepped piston, the only moving part, whose ends extend outside the engine block. This is possible because the two combustion chambers are located between the two ends of the piston. For this reason, the free ends of the piston may be used directly as working pistons in a compressor.

The design also permits the use of a hollow piston which may be used as a pump. A third possibility is for the piston to drive a linear generator, a generator that goes back and forth rather than spinning around.

Considerably Cheaper

Because of its simple design, the Steltzer engine will be considerably cheaper to manufacture than conventional Otto-cycle and diesel engines, according to the inventor.

Since the engine has only one moving part which is subjected to no radial load other than the dead weight of the piston, wear will be low, resulting in a long lifetime and low maintenance costs.

The absence of moving parts also will reduce fuel consumption. Fuel consumption will be 30 to 50 percent lower than in a conventional combustion engine, according to Steltzer.

Several types of fuel or fuel mixtures can be used, for example gasoline, methanol, diesel fuel, or kerosene, although tests with methanol have not yet been conducted.

Extremely Low Vibrations

Another characteristic of this engine is its low operating temperature of about 80°C and the extremely low vibrations. According to the inventor, the engine operates more evenly the higher its frequency. The frequency of the piston is limited by the piston rings.

With the molybdenum-coated rings used today, the limit is about 20,000 strokes per minute.

It is hoped that with ceramic pistons the frequency, and therefore the power, could be increased considerably.

The prototype engine shown at the automobile exhibition in Frankfurt last year and at the Hannover exhibition this year has a piston diameter of 140 mm and a stroke length of 40 mm. At 5,000 strokes per minute it has a power output of 74 kW (100 hp).

According to Steltzer's calculations, this power would be doubled at 12,000 strokes per minute. It has not been possible to increase the frequency of this engine, however, but a smaller engine has reached 20,000 strokes per minute.

Large and Small

The design is suited to both small and large engines, from 20 kW (27 hp) to over 750 kW (1,000 hp).

What does the future look like for Frank Steltzer and his engine? Interest seems to be high in the areas of compressors, generators, and especially pumps.

In September last year Steltzer founded a company in which various interests may purchase shares. The goal is to accumulate just over 23 million DM (just under 60 million kronor) for independent development of the concept. By February of this year about 100 interested parties had invested about

9 million DM.

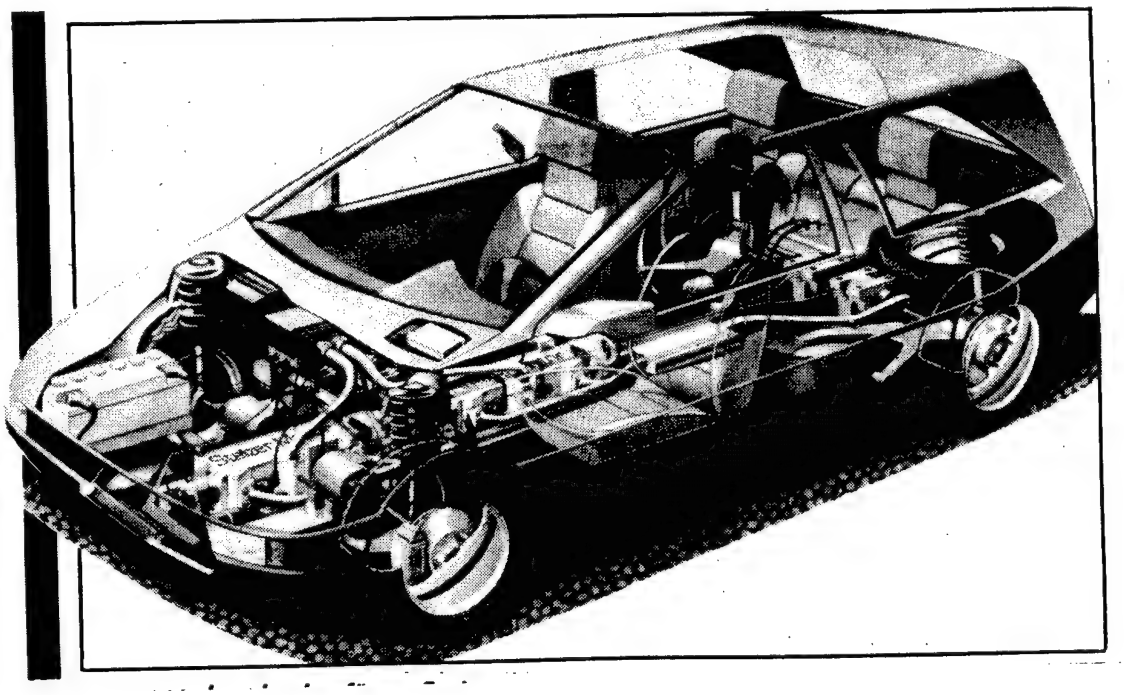
In Ireland Steltzer Motor Ireland Ltd. has been formed. The Irish government has promised to pay 60 percent of the production costs for pump motors.

It is also hoped that money for continued development will come from license sales to Arab countries. Steltzer's company will concentrate on producing engines suitable for series production and concepts for automobile propulsion.

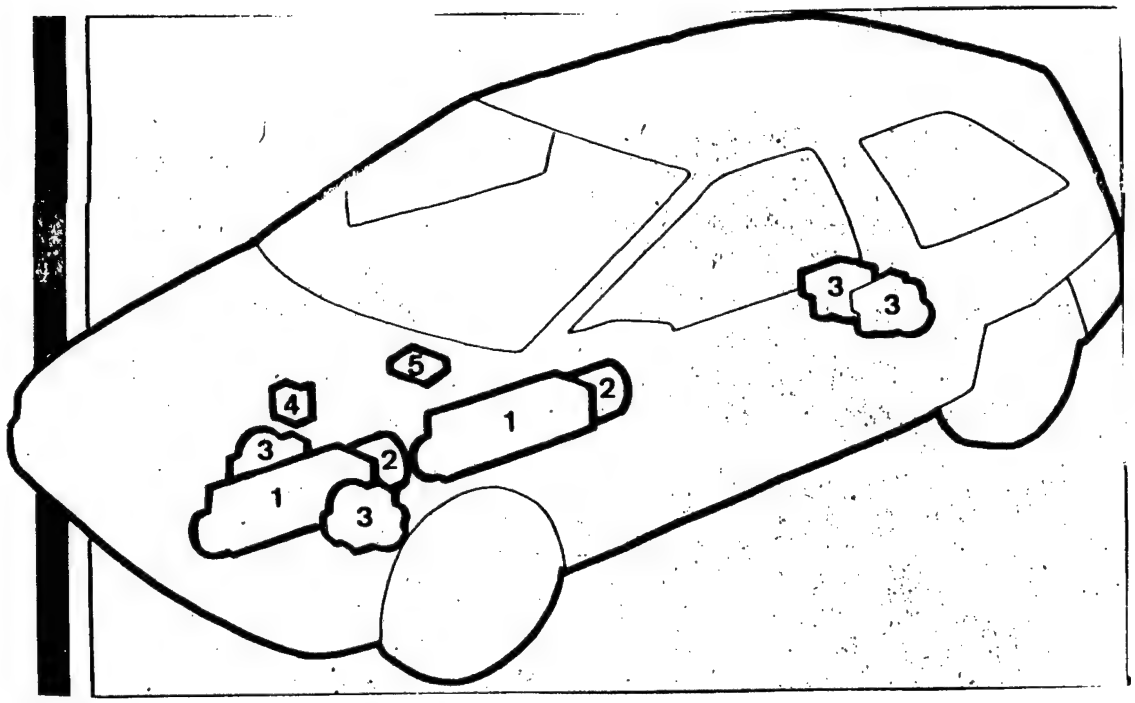
Frank Steltzer and his coworkers still have much to do, however. So far they have not had an engine in continuous operation under realistic conditions and, thus, experience in long-term operation is still lacking.

The engine also must be improved to reduce exhaust emissions and noise.

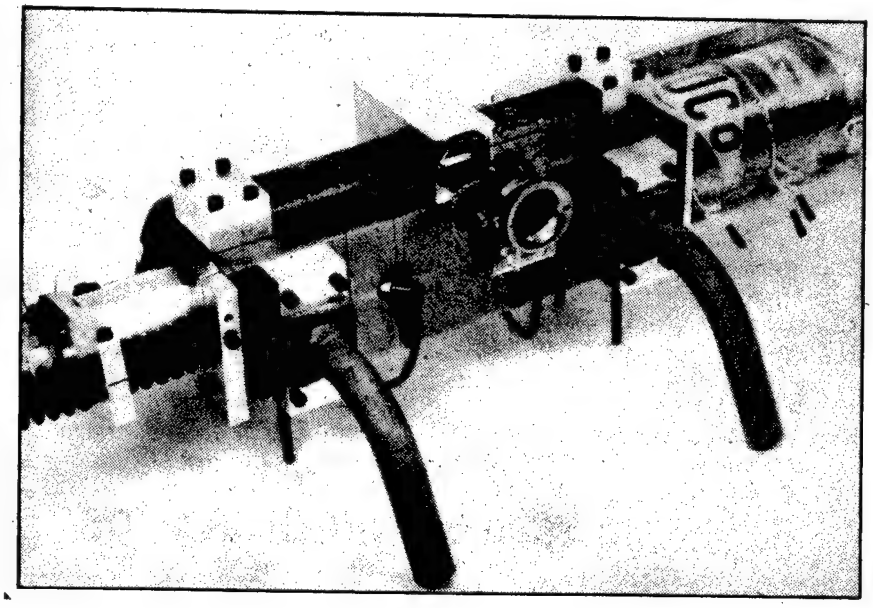
Despite these difficulties, Steltzer believes that the first Steltzer automobile will be on the road before 1985.



The first Steltzer automobile may look something like this. Little space is needed under the hood, since two long, narrow engines are mounted under the floor of the passenger compartment.

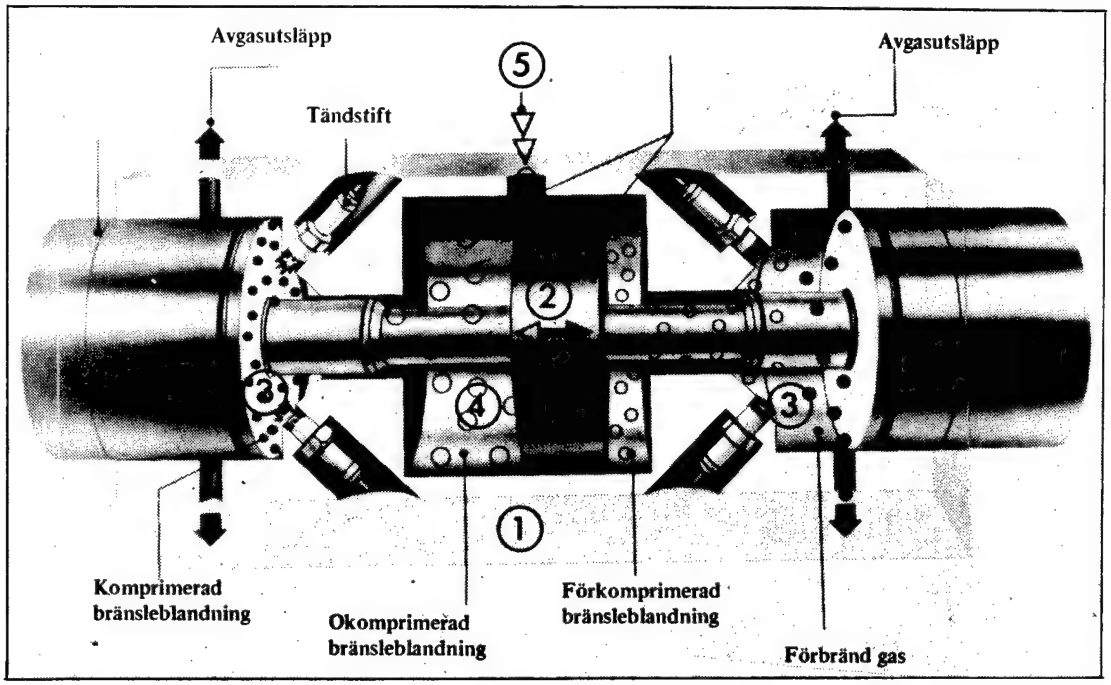


The car is designed in the following way: (1) engines that drive the generators (2) which, in turn, drive electric motors (3) located near each wheel. The computers (4) and (5) control the engines and the transmission of electric power.



A complete engine. The carburetor is in the middle. The two pipes are for the exhaust. The part on the far right is a linear generator. Mechanical power transmission is difficult, so the engine will be connected to a generator or a hydraulic motor.

(A) (B) (A)



(C)

(D) (G) (F)

The engine, which is a two-stroke three-piston engine, consists of eight parts. Seven of these for the engine block (1) and the remaining part is the stepped piston (2). The engine block contains two combustion chambers (3) and a compression chamber (4). As in a conventional two-stroke engine the fuel-air mixture is drawn from the carburetor (5) (or injection pump) into the compression chamber. The fuel mixture then is compressed (when the piston returns), after which it is allowed to pass into the combustion chamber while the burned gas is forced out at the same time. At the same time, the fuel mixture is drawn into the other half of the engine. When the fuel mixture is ignited the piston is pushed in the other direction and more fuel mixture is drawn in and the process repeats itself. In this way a linear oscillating piston movement arises in which the compressed gas acts as a shock absorber for the rapidly oscillating piston. The ignition system is magnetic and each combustion chamber is provided with two spark plugs for more rapid and even combustion. The frequency is regulated by the fuel supply. The higher the frequency, the higher the compression and, therefore the greater the power.

Key to figure:

A Exhaust

B Spark plug

C Compressed fuel mixture

D Uncompressed fuel mixture

E Precompressed fuel mixture

F Burnt fuel

9336
CSO: 3102/350

WORLD'S LARGEST SAIL-POWERED-VESSEL PROJECT

Stockholm NY TEKNIK in Swedish 29 Apr 82 pp 36-37

[Article by Christer Larsson]

[Text] With advanced technical design and a highly automated rigging system, a new age of sailing vessels could begin during the 1990's--assuming that the relatively high costs of bunker oil continue.

At least this is the hope of Lennart Apelstrand of Navire Cargo Gear, NCG, of Goteborg who, along with colleagues at the large Belgian Cockerill Shipyard, is involved in the world's largest sailing vessel project--the SBC-1. So far the project is still on the drawing board. But the wind is shifting in favor of the sailing vessel, according to the project leadership.

The EC Energy Commission in Brussels is aware of this change of wind and is helping finance the first stages of the project.

For over 2 years Lennard Apelstrand and his colleagues at NCG in Goteborg and Cockerill in Belgium quietly have made detailed studies for the totally new systems that must be developed for a modern sailing vessel of 30,000 dead weight tons.

With five masts and 12,160 square meters of sails, it will plow through the waves of the Atlantic between Europe and the east coast of the United States. The computer programs on the fourth floor of the NCG building on Gustaf Dalensgatan in Goteborg have calculated that it will do well over 20 knots at a wind velocity of Beaufort 9, i.e. 21 to 25 m/s or strong gale.

The estimated average speed is 12 knots for the round trip by sail alone. This is wholly acceptable, even for most machine-driven cargo carriers today.

Low-Economy Speed

Because of high bunker costs, motor vessels are forced to operate at low-economy speeds. Each extra knot may be the difference between profits and losses.

This year began with rock-bottom cargo prices. A shipment of wheat from the

United States to the Soviet Union on a 30,000-ton vessel yields 2,500 to 2,700 dollars per day for the shipping line. Such a load would be profitable under a Liberian flag, but would cover only 55 percent of the crew costs under Swedish flag, according to the Association of Shipowners. On the tanker market a quarter-million-ton vessel makes only 80 percent of its bunker costs when it sails at low-economy speeds. Today many shipowners must pay to ship cargo.

"Every cent OPEC adds to oil prices in the future brings us closer to a new epoch in commercial sailing vessels," Lennart Apelstrand said as he tapped one of the thick folders of the SBC study. The cost estimates are unequivocal when it comes to the competitive strength of the projected sailing vessel. The figures are confidential."

Fairway Buoy

"But they are highly reliable," Lennart Apelstrand said as he took a blueprint from one of the folders. It is a general plan showing the perspective of the ship. A modern 8-meter cruising yacht is drawn in for comparison. It looks like a fairway buoy astern of the enormous hull of the sailing vessel. It gives some indication of the proportions. It also says something about the task facing NCG which is responsible for all the enormous rigging equipment including sails, masts, and yards and the heavy, computer-controlled hydraulic system that will maneuver the rigging.

"Of course we have experts on navigation in our company, but in this case we have entered uncharted waters," Lennart Apelstrand admitted.

With 25 years of experience, NCG has developed into one of the world's leading companies in the development of loading platforms and cargo hatches. The company controls 30 percent of the world market and is represented by 11 subsidiaries, 6 companies under license, and 5 agencies in all parts of the world. The main office is in Goteborg, but the company is wholly owned by the Finnish Kone group.

Special Equipment

By specializing in platforms and hatches, NCG also has gained expertise in heavy hydraulics. That was the decisive factor when the company was asked to enter this dormant sector of navigation.

"We had manufactured some special equipment that the Belgians considered advanced. They then began to speak of their plan for a large, modern cargo-carrying vessel and the need for heavy hydraulic systems for the rigging. We were surprised when asked if we would be interested in conducting preliminary studies for a sailing vessel!

The basic concepts and most of the resources were at Cockerill. Some of the funds came from EC.

The Soviet Union also says it is interested in the future of large ocean-going cargo sailing vessels. Several preliminary conferences have been held on the subject, but the step from word to deed usually is a long one.

"Of course we feel like pioneers. If we did not believe seriously in the future of sailing vessels we would not be involved in a project of this type. I am convinced that the Japanese are on the right track," Lennart Apelstrand.

He returned again and again to the serious cost problem and oil prices that are forcing modern shipping to reexamine the entire field.

"Not even we believe that modern sailing vessels will put machine-driven vessels out of business. We do believe, however, that sailing vessels will be competitive, if not to say superior, for ocean trafic with so-called low-grade cargo such as wheat and coal and possibly oil.

The shipping industry is conservative by tradition, but navigation also is used to rapid changes. In Sweden today commercial shipping has been reduced to the same level of tonnage as in 1962. Since that year 10,000 jobs related to shipping have disappeared.

The shipping companies and the Seamen's Union are talking about saving the remaining 15,000 jobs in the industry by registering ships under flags of convenience or by classifying for tax purposes crew members on ships sailing abroad as Swedes living abroad.

Then a small multinational engineering firm in Goteborg enters the picture with a completely new dimension.

In one folder with preliminary studies Lennart Apelstrand located the still confidential patent drawings of the system that will maneuver the 12,160 square meters of sail across the Atlantic in all types of weather. The system was developed in a computer using the ship's specifications and weather conditions in the Atlantic.

But the product resulting from the work at computer terminals, on drawing boards- and at desks contains a number of technical pitfalls.

How will the problem of tolerance be solved and how will sails be changed? How many units must be doubled? How long should it take to reef the sails?

"One of our most difficult problems is the safety issue. In the old full-rigged ships the sails could be blown away if the wind was extremely strong. There must also be some weak links in a modern ship rigging. But what are the optimum values?"

Some of these questions will be answered when the English sailmakers complete the first set of sails made of new synthetic materials. Other answers will come when a full-scale prototype mast is raised onboard a commercial vessel that crosses the Atlantic which has promised to participate in the studies.

Later, if the project goes to completion, a relatively large-scale prototype will be constructed.

Computer Watches Masts

With a strong wind and all sails set the SBC-1--the sailing cargo ship--will pass most other sailing vessels between Vinga and Anholt some fine but windy summer day.

That is if it ever becomes reality and if its 12,160 square meters of sails ever should appear in Kattegatt. If this ever happens it would be a good idea to get out of the way. Traveling at over 20 knots by sail alone, with a length of 167.5 m, a width of 27 m, and a draft of 11.4 m the surge would be considerable. On the leeward side there probably would be no wind at all.

It is estimated that a crew of 27 would be required and their job would be, among other things, to maneuver and maintain the hydraulic system and machines that would be responsible for raising and lowering the enormous sails.

Unbraced Masts

The masts will be completely unbraced and the stress in various mast sections controlled by computers. There will be no need for sheets. Instead, the masts and yards will be turned by powerful steering machines.

Each mast will have 10 sails that may be reefed two at a time. Several systems in the rigging will be maneuvered totally automatically by computer programs.

Normally, no crew members will have to climb a mast. All maneuvering will be done from the deck.

Calculations have been made for various compositions and alloys for masts that will extend 91 meters above the tank top plating and 85 meters above the surface of the water. It is estimated that at deck level where the stress will be greatest the diameter of the masts will be 3 meters, while at the top it will be 1.2 meters. Work is underway to reduce these dimensions, if possible.

High Stress

Because of the amount of material required for the masts, high-strength steel is the only possibility from a cost standpoint. The stresses will be considerable when the Atlantic wind tests the strength of the masts. The SBC-1 will be able to beat much better than old sailing vessels--up to 60 degrees from the eye of the wind--and the sails will remain in place even when the wind rises.

An auxiliary motor and a propeller that can be moved in and out of the hull will assist the ship when it enters a port.
It is estimated that the maximum roll of the ship will be 10 degrees. That, if nothing else, could mean that life onboard would be unusually pleasant.

9336
CSO: 3102/323

END